
Active Learning in Medical Chemistry

Students document their own learning as they explore chemistry concepts and relate their understanding of the material to the human body, health and medical careers

Lauren Galvin - Materials Research Lab, Research Experience for Teacher 2015-2016

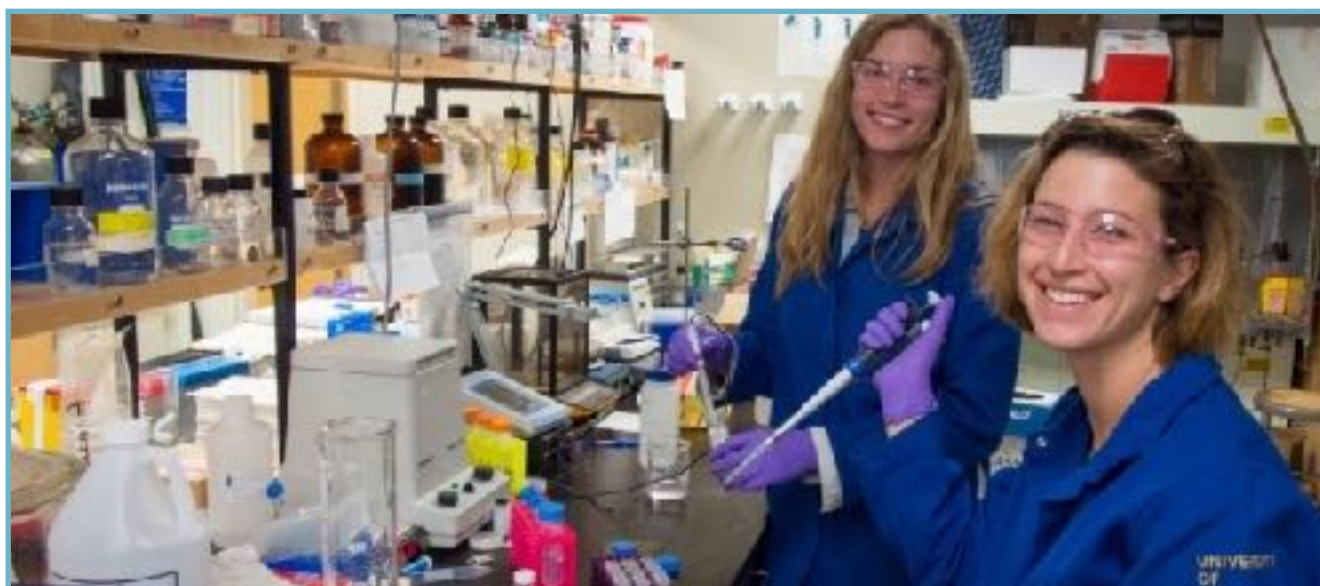


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Please note as this is a series of digital lesson designs that can be integrated within any course. There are many links placed throughout this document to help show how the series of lessons are used throughout the year specific to my medical chemistry course. All underlined sections of text are links.

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Abstract

This portfolio includes five lesson designs with corresponding materials that may be used to incorporate active learning by way of student website creation into your classroom. Students will engage in unit and quarterly capstone activities that will be documented in their student created websites. The activities become primarily student directed with guidance provided by my model website which explains formal expectations and grading policies. Though my model website unit writing prompts (one per each unit of study) are directly related to my Medical Chemistry course, the student website design and purpose can be used for any science course. The lessons are designed to gradually build science literacy skills and put scientific research into practice while gaining understanding of chemical concepts as related to the health field and medical technologies. In the final lesson they build their "Exploration Page" in which they will put their newfound skills and understanding of science into use as they engage in a group think-tank activity inspired by the ExploraVision National Competition.

Project Overview

Introduction to RET 1 Research

My RET 1 project focused on optimizing a lipid-nanocarrier for efficient loading and delivery of a hydrophobic drug: Paclitaxel. I worked under PhD Student, Victoria Steffes, in Professor Cyrus Safinya's research group. The goal of this project is to identify the characteristics and methods needed in order to optimize efficient hydrophobic drug delivery via lipid nano-carriers. The hydrophobic drug, Paclitaxel, is cancer therapy drug which inhibits the mitosis by stabilizing the microtubule structures during metaphase. The current focus of this project is to increase drug loading and effective delivery inside cells by determining the optimal lipid composition and physical characteristics of the liposome nano-carrier. During my RET 1 experience, I engaged in methods including the fabrication of liposomes, testing various liposome compositions on cells using viability assays, microscopy, and the evaluation of the physical properties of such nanoparticles.

Rationale

Medical Chemistry is a core Chemistry course designed to provide students with the opportunity to explore chemistry concepts as they relate to the human body, health and

medical careers. My research experience served as inspiration to provide students with the opportunity to engage in scientific processes as they discover the relationship between chemistry and the health field. These activities were designed to allow students to take more of an active role in their own learning, as one does in the cutting edge of medical/scientific research. Students will engage in activities that allow them the opportunity build upon their science literacy skills. Through this series of lesson designs they will build their own digital portfolio showing their progress throughout the chemistry coursework. This portfolio can serve as a body of work that students may take ownership of and use for future applications such as college applications and as a resume builder.

While working with Victoria, I was inspired by her self-driven research. Though the chemical processes throughout her studies were complex and fascinating, it was the process to consistently expand her knowledge that I hope to share with my students. She continuously set out to obtain more knowledge by exploring what technologies were already in use, what worked and what didn't. Given what she learned from her research, she continued to expand her knowledge regarding potentially more efficient ways of delivering cancer therapy drugs. She used her understanding of chemical and biological concepts to direct her research path, adjusting her path as her experiments and imagination guide her. It was the experience she built for herself that I hope to help my students understand.

Overview of Learning Objectives & Standards

Below you will find the learning objectives and activities addressed throughout the year. You will also find the learning objectives and activities within each unit page of the model website (see activity attachment and the bottom of each unit page) as well as the [Units of Study Page](#) of the Model Website. This Units of Study page also lists the relevant NGSS standards for each of the units as well. Throughout the activities, you will also notice a focus on Literacy in Science and Technical Subjects as outlined in [Appendix M of the Next Generation Science Standards document](#).

1.1: Units of Study at a Glance

Unit 1: Math and Measurement

(3 Weeks)

Unit Concepts Covered:

- Expanded vs Scientific Notation
- Metric Units
- Significant Figures
- Simple conversions
- Density

Unit Activities & Labs:

Density Lab

Medical Chemistry Activities used for Website Unit 1 Page:

- Accuracy and Precision
 - Each calculation done by a student has inherent error, in this activity they learn how many digits to keep from their calculator in order to show the limitation of their input data. They are first introduced to sig-figs and identification of place value, then they apply these calculations. Students practice using values from normal medical lab tests and need to do research in order to find a diagnosis for each patient based on their lab tests (Health and Science Pipeline Initiative.)
- Bone Density and Osteoporosis
 - Bone density is an important measurement to determine bone strength. As people age, especially women, they tend to get osteopenia or osteoporosis which can lead to severe bone breakage. In this module students will calculate the density of various bone samples as cubes or cylinders. Students use the density equation to find the density of samples. Students apply the cube volume and cylinder volume equations to density problems (Health and Science Pipeline Initiative.)

Medical Math and Chemistry Curriculum modules were funded in Fall of 2015 by the Teacher Prep Pipeline- Medical resources found and adapted from the Health and Science Pipeline Initiative (HASPI) web page at HASPI.org

Unit 2: The Periodic Table & Bonding

(4 Weeks)

Unit Concepts Covered:

- Bohr's Bright Line Spectrum
- Quantum Mechanical Model of the Atom - position of electrons/orbitals

-
- Ground State vs Excited State Configurations
 - Using the Periodic Table - Element Characteristics
 - Ionic or Covalent (based on name or formula)
 - Writing names for Ionic compounds, Covalent molecular compounds and acids
 - Draw diagrams of compounds forming (gaining/losing or sharing electrons)
 - Determine the shape of a covalently bonded molecule
 - Determine when a covalent molecule is polar or non-polar

Unit Activities & Labs:

- *Flame Test*
- *Periodic Table Puzzle*
- *Periodic Trends Activity*
- *Twelve in a Bottle Mystery Lab*
- *Determining Bonding Types Lab*

Medical Chemistry Activities used for Website Unit 2 Page:

Determining Bonding Types Lab in which students are given three unknown substances and need to deduce which is ionic, which is covalent and which is polar covalent through testing the solubility, melting point and conductivity of the substances. The background emphasizes the role of electrolytes in the body. Objectives include: Describe the role of electrolytes in the body. Determine whether a substance is ionic or covalent based on solubility and/or melting point. Use evidence to identify an unknown (Health and Science Pipeline Initiative.)

Unit 3: Reactions

(4-5 Weeks)

Unit Concepts Covered:

- Matter
- Chemical, Physical & Nuclear Changes
- Elements, Compounds & Mixtures
- Atomic Theory
- Parts of an Atom
- Interpreting Isotope Notation
- Using knowledge of the Periodic Table and Ionic & Covalent nomenclature - read and write chemical reaction equations using conventional symbols.
- Use the Law of Conservation to balance chemical reactions
- Recognize and classify reactions as one of six types
- Identify whether a reaction is end or exothermic
- Predict products of the six types of reactions with aid of the periodic table, activity series of metals and solubility rules of ionic compounds

Unit Activities & Labs:

Types of Reactions Lab + Formal Lab Write-Up
Halloween Lab

Medical Chemistry Activities used for Website Unit 3 Page:

The Unit 3 Page will be replaced with a BLOG post in response to a reading on Nanotechnology. Students will read the provided article and answer a series of questions. They will have to research a nanoparticle of their choice and report on that particles structure and function. Student will post to BLOG page in paragraph format using their question responses as a guide.

Unit 4: Stoichiometry

(4-5 Weeks)

Unit Concepts Covered: Define a mole

- Solve problems related to the mole using conversion technique, including the use of Avogadro's number, molar mass and mole to mole ratio
- Determine max yield, percent yield, limiting reagent and reagent in excess
- Determine the percent composition of a compound
- Determine the empirical formula

Unit Activities & Labs:

Silver Stoichiometry Lab
Aspirin Titration Lab

Medical Chemistry Activities used for Website Unit 4 Page:

Aspirin Titration Lab in which students compare two types of aspirin using titration. Students will calculate how much NaOH is should take to neutralize the aspirin based on stoichiometric calculations. Calculate e how much NaOH is actually takes to neutralize the aspirin and do a percent error calculation. *The more reactant you add the more product you get (Health and Science Pipeline Initiative.)

2.1: Introduction to Model Website & Creation of Student Websites Lesson Design

Website Introduction & Creation

Topic

Class Introduction: Website Introduction and Creation

Subject/Grade Level

10th Grade, Medical Chemistry

Activity Duration

This website introduction and creation will take two to three class periods in the computer lab to complete. I was able to complete within one 90 minute block period.

Materials

- Computer Lab with internet access (1 computer per student)
 - Website Introduction PowerPoint
 - Model Website: MedicalChem.weebly.com
-

Learning Objectives & Standards

Students will be able to navigate through the Model Website which contains their unit assignments and rubrics for the course

Students will be able to create and personalize a website using the Weebly program

Background Information

Weebly.com is a free (to the capacity that we will be using it) website-made-easy program that students will be required to create a login for. Though my lesson design uses the weebly program, there are many other options that may be better suited for you or your district.

Instructional Design

This lesson is primarily teacher directed. Students will be asked to follow the [PowerPoint instructions](#) as they are introduced to the Model Website and begin the creation of their own website. Students will be given the opportunity to *play* with the Weebly “elements” in an effort to familiarize themselves with the program options. They will be asked to participate in a classroom discussion about what they were able to do with their elements. They will leave with an introductory understanding of the website expectations, how to navigate through the Model Website, how to explore the creation of their own website and a personal website with their HOME, ABOUT, UNIT 1 and BLOG pages completed.

See the [PowerPoint instructions](#) as they walk you through the lesson design step by step which links within it a [video \(from the weebly company website\)](#) showing how to create pages using their “drag and drop” feature.

Assessments

Formative:

Group discussion about Weebly “elements”

Each group will be called upon to share what “elements” they discovered

Observation as they create their websites

Summative:

Completed website setup

2.2: Introduction to Model Website & Creation of Student Websites Presentation




Welcome to Medical Chemistry!

Website Introduction & Creation

Step 1:

Visiting our "Model Website"



Find your OWN computer and open the internet browser

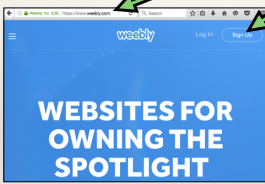
Go to : MedicalChem.weebly.com

Begin by reading the HOME page. There is also a link to this powerpoint if you want to open on your own computer and follow along at your own pace.

Be sure to visit the Sports Medicine Pathway link on the HOME page.

Step 2:

Create your own!



1. Open a new browser and go to: weebly.com
2. Create a Login by clicking on "Try It Free" or "Sign Up" in the upper righthand corner of the page
3. Enter your name, email and password and "sign up"
4. BEFORE choosing a theme, write the email login and the password you chose to use inside the front cover of your class notebook

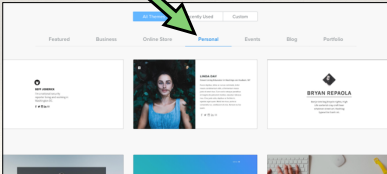
Step 3:

Choosing a Theme

This is the template or blueprint for your website

Go the the PERSONAL theme options.
Chose a THEME in this category only.

Don't take too much time picking a theme! You can ALWAYS change it later. Just choose one that catches your eye and move on so you don't miss the next step.



Step 4:

Choosing Your Website Domain

This will be used as your website address

1. Select the "Use a Subdomain of weebly.com" option by clicking on the circle to the left of that option.




2. Type in a domain that makes sense. Like...
LaurensMedicalChemPortfolio or *MedChemROCKS.weebly.com*

You are free to choose your own name! Just be sure its appropriate and relative. You can also change this in the next few weeks before you publish your page on the internet.

Step 5:

Learn How to Build

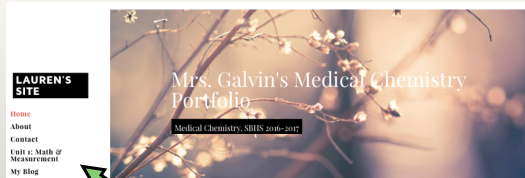
1. Watch this video from the weebly help center to learn how to add ELEMENTS



2. Take a moment to play around with the site elements to see what options you have to build your site. *Don't worry, you can undo anything!*
3. After watching the video and playing around a bit, discuss one thing that you are excited about using with an elbow partner. Be ready to share with the class!

Step 6:

Follow Along with Me

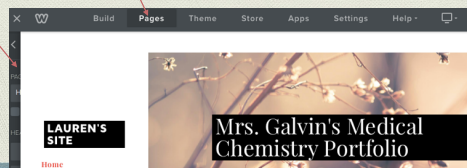


Next we will be creating our HOME, ABOUT, UNIT 1, BLOG and CONTACT page together

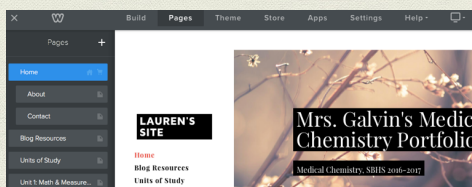
Please be ready to follow along
and raise your hand if you have ANY questions or feel a bit lost

How to Create UNIT PAGE

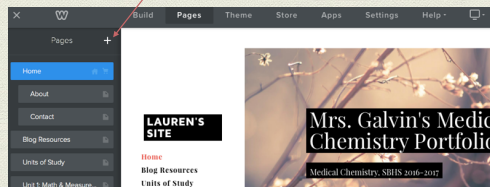
- ◆ Click on Pages at the top of your weebly screen.
- ◆ Bring your cursor over to the left hand side of your screen



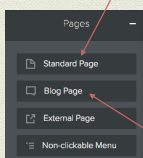
- ◆ When you bring your cursor over to the left hand side of the screen, you should see the screen as shown below



- ◆ Click on the + sign to add another page to your website



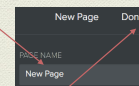
- ◆ A few options will drop down. For the Unit Pages, the About Page and the Contact Page you will choose the Standard Page option.



- ◆ For the Blog Page. You will choose the Blog Page option.

- ◆ Once you choose Standard Page. You will be given the opportunity to name your new page. Click in the text box and name your first page:

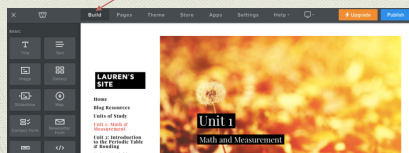
"Unit 1: Math & Measurement"



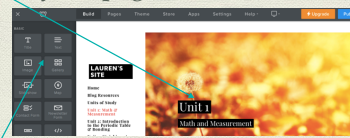
Then click "Done"

Unit 1: Math & Measurement

- ◆ Now that you have create your first page you can “Build” That page using the elements you learned about in the weekly video we watched. Click on “Build” at the top of your page.



- ◆ Now you can title your page as shown



- ◆ You are now able drag and drop elements into your page
- ◆ Lets set up your other page first so you can work on them in your own time...

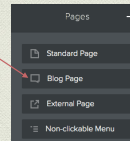
The About & Contact Pages

- ◆ For these two pages you will follow the same steps you went through to create your Unit 1 Page
- ◆ Start by going page up to Pages at the top pf your screen
- ◆ Move your cursor over to the left and find the + sign to add another page.
- ◆ Select Standard page
- ◆ Name the page appropriately
 - ◆ One page named: About
 - ◆ One page named: Contact
- ◆ Click Done after each

See previous slides for images of steps

Blog Page

- ◆ For the Blog page you will follow the same steps and the other pages, only you will choose Blog Page when choosing you page type



- ◆ Again press done when you are finished

- ◆ You have now have 4 different pages within your site
 - ◆ You have your Home Page which was created automatically when you created your site.
 - ◆ Your Unit 1 Page
 - ◆ Your About Page
 - ◆ And your Blog page

You will document your learning thought our course! I will give you assignments in my model website and you will complete your assignments in your own website.

We will begin Unit 1 the next time we come to the computer lab. So save that weekly login somewhere where you wont forget it!!!

3.1: Objectives & Career Spotlight Page Lesson Design

Unit Objectives & Career Spotlight Page

Topic

Unit Objectives and Career Spotlight Webpage

Please note, this lesson design will serve as a capstone for multiple units. The lesson is very general as it can be used for multiple units of study throughout the school year. Students will acknowledge their own learning objectives met throughout the unit and research how they relate to the medial field. They will document their own learning in their personal websites. For the specific units I have assigned Unit Objective & Career Spotlight Page as the lab skills met in this specific unit were too far of a reach for students to relate to the medial field at this level of understanding. For the units in which students completed labs that were directly related to the medical field, students engaged in the Lab and Present Technology Page lesson plan.

Subject/Grade Level

10th Grade, Medical Chemistry

Activity Duration

This activity will take either two class periods in the computer lab or one class period with the expectation that students complete the assignment for homework. See Objectives & Career Spotlight Example (Unit 1) for guidance regarding time and expectations.

Materials

- Computer Lab with internet access (1 computer per student)
- Unit Activity (Multiple activities used throughout the year)
- Model Website: MedicalChem.weebly.com
- Student Websites

Learning Objectives & Standards

As this lesson format is repeated for multiple units, objectives and standards vary depending on the unit. See [Units of Study Page](#) for a list of learning objectives and standards accomplished in each unit of study.

Background Information

Prior to the suggested activity, students will have covered unit topics listed in the [Unit of Study Page, Objectives](#). This is a capstone assignment that allows students the opportunity to document their understanding of the unit material and research its relation to the medical/health field.

Instructional Design

This lesson is primarily student directed with the assistance of the [Model Website](#). Students are asked to use their class notebooks and their unit activities to inspire their responses to the writing prompts posted in the website. Within each unit tab, you will find writing prompts, a link to the grading rubric used and a link to a blank version of the activity for student reference. Students will search via internet for careers relative to each unit of study and update their websites in class. Upon completing their webpage, students will grade themselves using the Objectives and Career Spotlight Rubric before submitting for formal grade.

Assessments

Summative:

Completed unit tab - writing prompt responses

Self graded rubric

3.2: Objectives & Career Spotlight Page Rubric

OBJECTIVES & CAREER SPOTLIGHT GRADING RUBRIC

	Complete	Partial	Poor
Content	<ul style="list-style-type: none"> Content is thorough & accurate. Major points are stated clearly & are well supported. Research is adequate, timely & addresses the relative question. Content & purpose of the writing is clear. 	<ul style="list-style-type: none"> Content is not entirely comprehensive. Major points are addressed, but not well supported. Research is somewhat inadequate or does not completely address prompt. Content is somewhat inconsistent with regard to purpose and/or clarity of thought. 	<ul style="list-style-type: none"> Content is not comprehensive OR it is incomplete. Major points are not clear and/or relative Research is inadequate or does not address prompt. Content is inconsistent with regard to purpose and clarity of thought.
Organization & Structure	<ul style="list-style-type: none"> Structure of the paragraph is clear & easy to follow. 	<ul style="list-style-type: none"> Structure of the paragraph is not very easy to follow. Paragraph transitions need improvement. 	<ul style="list-style-type: none"> Organization and structure detract from the message of the response or structure of the paragraph is difficult follow. Paragraph is disjointed - there is a lack transition of thoughts.
Format	<ul style="list-style-type: none"> Unit page follows Model Website guidelines. Prompts are the appropriate length as described in the Model Website. 	<ul style="list-style-type: none"> Unit Page follows most Model Website guidelines. Prompt responses are over/under assigned length. 	<ul style="list-style-type: none"> Unit Page lacks many elements of correct formatting. Prompt responses are inadequate/excessive in length.
Grammar, Punctuation and Spelling	<ul style="list-style-type: none"> Rules of grammar, usage & punctuation are followed; spelling is correct. Language is clear & precise; sentences display consistently strong structure. 	<ul style="list-style-type: none"> Responses contain few grammatical, punctuation and spelling errors. Language lacks clarity or includes the use of some jargon or conversational tone. 	<ul style="list-style-type: none"> Responses contain numerous grammatical, punctuation, and spelling errors. Language uses jargon or conversational tone.

Adapted From: <<http://www.rcampus.com/rubricshowc.cfm?sp=true&code=Z643W&>>

3.3: Model Website Assignment Example- Unit 1

Accuracy & Precision in Medicine OR Bone Density & Osteoporosis

Instructions: In the Unit 1 Tab of your website, respond to the writing prompts below. The structure of you Unit 1 Tab should mimic this page. Including an appropriate page image of your choice and the title of the page as shown above. All subtitles in black should be included as well as one image relative to the career researched. Your answers must be in complete sentences and use proper sentence structure (**see the RUBRIC link at the bottom of the page**). Your answers must contain the listed terms on your activity handout (link at the bottom of this page if needed) and use them in the correct context.

Learning Objectives

Paragraph 1: State at least two learning objectives you met throughout the activity. This should be in paragraph form, with complete sentences, not bullet points.

Paragraph 2: State how the objectives learned apply toward the medial field. Please elaborate. I want to hear all of your thought regarding how the learning objectives could potentially related to the medical field. Feel free to do some internet research while we are in the computer lab, just be sure to SITE all resources.

Career Spotlight!

Paragraph 1: Choose a medical career that relates to learning objectives. Describe the career in full: its branch within health field, the responsibilities involved etc. Internet research the career you chose to focus on but please be sure to site your sources appropriately. Explain in detail how the learning objectives you met while engaging in the unit activity relate to that career.

Paragraph 2: Additional information should include educational level (with details of the education focus) and/or professional experience required. Feel free to elaborate on average salary, potential working environments or areas of focus (like a specialty.)

3.4: Student Assignment Examples- Unit 1

<http://adriandelamoramedchem.weebly.com/unit-1-math-and-measurement.html>

<http://saramedicalchem.weebly.com/unit-1-math-and-measurement.html>

<http://itzelpvmedicalchemistry.weebly.com/unit-1-math--measurement.html>

<http://medicalchemi.weebly.com/unit-1.html>

4.1: Lab Abstract and Present Technology Page Lesson Design

Abstract & Present Technology Page

Topic

Abstract and Present Technology Webpages

Please note, this lesson will serve as a capstone for multiple units. The lesson is very general as it can be used for multiple units of study throughout the school year. Students will acknowledge their own learning objectives met throughout the unit and research how they relate to the medical field. They will document their own learning in their personal websites. For the specific units I have assigned Abstract and Present Technology Page, the unit lab allowed students to practice skills directly related to the medical field.

Subject/Grade Level

10th Grade, Medical Chemistry

Activity Duration

This activity will take two class periods in the computer lab or one class period with the expectation that students complete the assignment as homework.

Materials

- Computer Lab with internet access (1 computer per student)
 - Unit Lab (multiple lab activities associated with this lesson design)
 - Model Website: MedicalChem.weebly.com
 - Student Website
-

Learning Objectives & Standards

As this lesson format is repeated for multiple units, standards vary depending on the unit. See [Units of Study Page](#) for a list of learning objectives and standards accomplished in each unit of study.

Background Information

Prior to the suggested lab, students will have covered unit topics listed in the [Unit of Study Page, Objectives](#). This is a capstone assignment that allows students the opportunity to document their understanding of the unit material and research its relation to the medical/health field, specifically technology applications.

Instructional Design

This lesson is primarily student directed with the assistance of the [Model Website](#). Students are asked to use their unit notebooks and their completed unit lab to inspire their responses to the writing prompts posted in the website unit tab. Within each unit tab on the Model Website, you will find writing prompts, a link to the rubric and a link to a blank version of the associated lab for reference. Students will search via internet for modern technology relative to each unit of study/lab and update their websites as suggested. Upon completing their webpage, students will grade themselves using the Abstract and Present Technology Rubric (link found in each corresponding page) before submitting for formal grade

Assessments

Summative:

Completed unit tab - writing prompt responses

Self graded rubric

4.2: Lab Abstract and Present Technology Page Rubric

LAB & PRESENT TECHNOLOGY GRADING RUBRIC

	Complete	Partial	Poor
Content	<ul style="list-style-type: none">Content is thorough, accurate & persuasive.Major points are stated clearly & are well supported.Research is adequate, timely & addresses the relative question.Content & purpose of the writing is clear.	<ul style="list-style-type: none">Content is not entirely comprehensive and/or persuasive.Major points are addressed, but not well supported.Research is somewhat inadequate or does not completely address course concepts.Content is somewhat inconsistent with regard to purpose and/or clarity of thought.	<ul style="list-style-type: none">Content is not comprehensive and/or persuasive OR it is incomplete.Major points are not clear and/or persuasive.Research is inadequate or does not address course concepts.Content is inconsistent with regard to purpose and clarity of thought.
Organization & Structure	<ul style="list-style-type: none">Structure of the paragraph is clear & easy to follow.	<ul style="list-style-type: none">Structure of the paragraph is not very easy to follow.Paragraph transitions need improvement.	<ul style="list-style-type: none">Organization and structure detract from the message of the response or structure of the paragraph is difficult follow.Paragraph is disjointed - there is a lack transition of thoughts.
Format	<ul style="list-style-type: none">Unit page follows Model Website guidelines.Prompts are the appropriate length as described in the Model Website.	<ul style="list-style-type: none">Unit Page follows most Model Website guidelines.Prompt responses are over/under assigned length.	<ul style="list-style-type: none">Unit Page lacks many elements of correct formatting.Prompt responses are inadequate/excessive in length.
Grammar, Punctuation and Spelling	<ul style="list-style-type: none">Rules of grammar, usage & punctuation are followed; spelling is correct.Language is clear & precise; sentences display consistently strong structure.	<ul style="list-style-type: none">Responses contain few grammatical, punctuation and spelling errors.Language lacks clarity or includes the use of some jargon or conversational tone.	<ul style="list-style-type: none">Responses contain numerous grammatical, punctuation, and spelling errors.Language uses jargon or conversational tone.

Adapted From: <<http://www.rcampus.com/rubricshowc.cfm?sp=true&code=Z643W&>>

4.3: Model Website Assignment Example- Unit 2

Determining Bonding Types Lab

Instructions: In the Unit 2 Tab of your website, respond to the writing prompts below.

The structure of you Unit 2 Tab should mimic this page. Including an appropriate page image of your choice and the title of the page as shown above. All subtitles in black should be included as well as two appropriate images, one of your lab group working on the lab and one relative to your Present Technology section.

Your answers must be in complete sentences and use proper sentence structure (**see the RUBRIC link at the bottom of the page**). Your answers must contain the listed terms on your lab handout (link at the bottom of this page if needed) and use them in the correct context.

Abstract

Paragraph 1: What did you DO in this lab?

- What did you test?
 - What was the goal of the lab? What were you specifically testing in an effort to meet your lab goal? How did you physically perform the experiments you did? What was the final outcome/findings?

Paragraph 2: What are electrolytes?

- How did you identify electrolytes in your lab activity? What did you learn about electrolytes and how they play a physiological role in your body?

Present Technology

Paragraph 1:

How do health practitioners test for electrolytes? - explain in as much detail as you can using your new knowledge of electrolytes and how they respond to their environment.

Why do health practitioners test for electrolytes? - under what circumstances do they perform this test? What could potentially be wrong with an individual to need such a test? How could performing such a test help that individual. Say more than, "because it would solve the problem." explain how and why the health problem could have occurred in the first place.

Paragraph 2:

Are there any limitations to this test? - Is there a notable circumstance in which the results would be inaccurate? Describe the limitations in detail. As you perform more and more experiments throughout Chemistry, you will notice that the practice of science in the lab is not always smooth nor black and white. Sometimes, an experiment will need to be performed multiple times before seeing results without error. When I ask about limitations of the electrolyte test, I would like to know if there are any potentially common inherent errors.

4.4: Student Assignment Examples- Unit 2

<http://mishellsmedchemportfolio.weebly.com/unit-2.html>

<http://medicalchemi.weebly.com/unit-2.html>

<http://adriana.delamora.medchem.weebly.com/unit-2-introduction-to-the-periodic-table--bonding.html>

5.1: Blog Submission Lesson Design

Blog Entry & Comments to Peers Page

Topic

Blog Entry and Comments to Peers

Subject/Grade Level

10th Grade, Medical Chemistry

Activity Duration

This activity will take multiple class periods. Duration may vary as you can easily break activities apart so that you can use a part of a class period at a time.

Materials

- Scientific Articles (provided to students for first and second blog entrees only)
 - Computer Lab with internet access (1 computer per student)
 - Model Website: MedicalChem.weebly.com
-

Standards

As this lesson is repeated at different parts of the year, standards vary. Blog posts will have an emphasis on Literacy in Science ([Appendix M, NGSS](#)).

Learning Objectives

Students will be able to read science articles of various reading levels and determine what the text says.

Students will be able to evaluate content in an effort to draw conclusions and formulate opinions.

Students will be able to evaluate the legitimacy of the article based on the author, author's resources and article credibility.

Students will be able to engage in conversation (via blog comments) based upon readings and build upon each others ideas.

Background Information

Students will engage in three blog posts and three blog comments upon reading a peers post throughout the year, one post and one comment per quarter (for the first three quarters). They will progressively build towards researching their own articles (given a suggested subject matter). The quarter 1 blogpost will be much more scaffolded than the posts to follow. These activities will build toward their participation in the final web page, the Exploration Page, which will take place during the fourth quarter.

Instructional Design

Quarter 1:

1. Students will be put in groups of four after being assigned the article readings and an Annotation Guide as homework the week prior. They will work together to complete their Research Comprehension of Scientific Articles Worksheet in class. Students will be asked to turn their worksheet upside-down while discussing with the group mates. They will be given time to write their responses into their worksheet individually after discussing each statement/question as a group.
2. The [Model Website Blog Resources Page](#) has guidelines as to what I expect per each blogpost. I will spend time presenting the Resources Page, as well as my own [blogpost](#) in response to the readings, and the Blog Entry and Comments Rubric.
3. Students will then be asked to create their own blogpost on their own website in response to the articles. Upon submission, students will grade their own blogpost using the Blog Entry and Comments Rubric.
4. Finally, students will respond to a peer's blogpost (Blog Entry and Comments Rubric applies to their response as well)

Quarter 2:

Students will engage in the same set of activities as stated above. *For Quarter 2, I will no longer write a blogpost for them to refer to.*

Quarter 3:

Students will engage in the same set of activities as stated in Quarter 1. *For Quarter 3, I will no longer write a blogpost for them to refer to and I will not provide their articles for them. Instead I will provide multiple search engine sites for them to research a assigned topic with.*

Assessments

Formative:

Group Discussions

Summative:

Completed Research Comprehension of Scientific Articles Guide

5.2: Blog Submission Rubric

BLOG ENTRY & COMMENTS RUBRIC

	Complete	Partial	Poor
Content	<ul style="list-style-type: none">• Post provides comprehensive insight, understanding, and reflective thought about the topic.• Statements are supported by research and evidence.• Post has a focus that is cohesive and fluently written.• Post follows the guidelines stated in the <u>Model Website</u>.• Discussion on the advancement of technology is creative and/or logical.• Supporting sources are linked within applicable text.	<ul style="list-style-type: none">• Post provides <i>moderate</i> comprehensive insight and reflective thought about the topic.• Statements are supported by research and evidence <i>but not all</i> sources/statements enhance the information presented.• Post has a focus that is <i>somewhat</i> cohesive/fluently written.• Post is <i>unorganized</i> according to the guidelines stated in the <u>Model Website</u>.• Discussion on the advancement of technology is <i>somewhat</i> creative and/or logical.• Supporting sources are linked within applicable text.	<ul style="list-style-type: none">• Post <i>does not</i> provide comprehensive insight and reflective thought about the topic.• Statements <i>are not</i> supported by research and evidence.• Sources/statements <i>do not</i> enhance the information presented.• Post <i>does not follow</i> the guidelines stated in the <u>Model Website</u>.• Post <i>does not</i> have a focus or <i>focus is not clear</i>.• Discussion of the advancement of technology <i>is not</i> creative and/or logical.• Supporting sources are <i>not</i> linked within applicable text.
Graphics	<ul style="list-style-type: none">• Images are inserted into posts where appropriate.• Choice of images enhance the contents visual appeal and increase readability.	<ul style="list-style-type: none">• Images are inserted into posts <i>but could be placed more thoughtfully</i>.• Choice of images <i>somewhat</i> enhance the contents visual appeal.	<ul style="list-style-type: none">• Images inserted are <i>poorly placed</i>.• Choice of images <i>detract</i> from the contents visual appeal and <i>decrease</i> readability.
Citations	<ul style="list-style-type: none">• ALL sources of information and images display accurate citations and links.	<ul style="list-style-type: none">• <i>Most</i> sources of information and images display accurate citations and links.	<ul style="list-style-type: none">• Sources of information and images are <i>missing</i> or display <i>inaccurate</i> citations and/or links.
Grammar, Punctuation and Spelling	<ul style="list-style-type: none">• Rules of grammar, usage & punctuation are followed; spelling is correct.• Language is clear & precise; sentences display consistently strong structure.	<ul style="list-style-type: none">• Responses contain few grammatical, punctuation and spelling errors.• Language lacks clarity or includes the use of some jargon or conversational tone.	<ul style="list-style-type: none">• Responses contain numerous grammatical, punctuation, and spelling errors.• Language uses jargon or conversational tone.

Adapted From: <<https://www2.uwstout.edu/content/profdev/rubrics/blogrubric.html>>

HOW TO POST ON YOUR BLOG

Blog Post #1 Topic: Nanotechnology (Nanoparticles used in Medical Treatments)

Blog Post #2 Topic: Present Medical Technology Relative to the Immune System

SOME HELPFUL ARTICLE SEARCH ENGINES:

Science News

Science Daily

Santa Barbara High Library Data Base Menu

WHAT SHOULD EACH BLOG POST INCLUDE?

A Snappy Headline:

If you want people to read your blog, you have to interest them! Don't bore them with a generic ole headline after putting your precious time and energy into your post. Be sure to make it DESCRIPTIVE, but don't hold back from adding your own little twist of humor or wit!

Source Your Images:

Each post would have 1-2 images attached. If they are not your own, be sure to add a text box below each image giving credit where credit is due.

Structure:

First, you should write an overview of your research. Give us a summary of the topic you read about.

Second, tell us about the the good stuff! Discuss two or three aspects that were most interesting to you.

Third, the not so good stuff. Write about what didn't work so well. This is important because it adds credibility to your opinion. YOU were able to look at it from two sides.

And finally, your verdict. Explore how this technology can advanced upon given your understanding of its pros and cons.

Are there different ways in which you can use this technology? Can you see this technology growing into a *new* medical tool/field? How?

See **RUBRIC** for grading policy

5.4: Blog Submission Student Examples- Blog Post #1

<http://medicalchemi.weebly.com/tiny-bubbles-in-our-body>

<http://shephelahmedicalchem.weebly.com/blog>

<http://adrianadelamoramemedchem.weebly.com/blog.html>

<http://itzelpvmedicalchemistry.weebly.com/blog>

6: Future Steps - Exploration Page

Students will continue to build their websites throughout second semester. In place of a fourth quarter blog post, students will collaborate in small groups to create their “Exploration Page.” This experience will be modeled after the [ExploraVision](#) Competition, allowing students to enter the competition upon completion of the course.